ORAL ARGUMENT NOT YET SCHEDULED

No. 18-5214

In the

United States Court of Appeals

for the

District of Columbia Circuit

UNITED STATES OF AMERICA,
Plaintiff-Appellant,

v.

AT&T, INC.; DIRECTV GROUP HOLDINGS, LLC;
and TIME WARNER INC.,
Defendants-Appellees.

On appeal from a final judgment of the
U.S. District Court for the District of Columbia,
Hon. Richard J. Leon, No. 1:17-cv-2511

BRIEF *AMICI CURIAE* OF 37 ECONOMISTS, ANTITRUST SCHOLARS, AND FORMER GOVERNMENT ANTITRUST OFFICIALS IN SUPPORT OF APPELLEES AND SUPPORTING AFFIRMANCE

ANDREW J. PINCUS
MARK W. RYAN
MICHAEL B. KIMBERLY
Mayer Brown LLP
1999 K Street NW
Washington, DC 20006
(202) 263-3127

Counsel for Amici Curiae

CIRCUIT RULE 28 CERTIFICATE

Pursuant to Circuit Rule 28(a)(1), *amici curiae* certify as follows:

(A) *Parties and Amici*. All parties, intervenors, and *amici* who appeared before the district court and are appearing before this Court are listed in the proof brief for the appellees, except for those *amici curiae* who submit this brief.

(B) *Rulings Under Review*. References to the rulings at issue appear in the Proof Brief of Appellant United States of America.

(C) *Related Cases*. The case on review was not previously before this Court or any other court. Counsel is not aware of any related case pending before this Court or any court.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

CIRCUIT RULE 29 CERTIFICATE

Pursuant to Circuit Rule 29(d), *amici curiae* certify that the filing of this brief separate from other *amici* is necessary because (i) counsel worked diligently to coordinate a single brief among the 37 individuals signing the present brief; (ii) in light of the expedited briefing schedule, it was not practicable to coordinate further with other *amici*; (iii) *amici* are economists, antitrust scholars, and former government antitrust officials whose dispassionate views and scholarly expertise differ in important respects from the perspectives of other *amici* participating in the case; and (iv) this brief does not repeat factual or legal arguments made in the appellees' principal brief or (to our knowledge) any other *amicus* brief.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

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STATEMENT OF INTEREST

Amici curiae are 37 experienced economists, antitrust scholars, and former government antitrust officials who share a professional interest in seeing antitrust law develop in a manner that applies reliable economic principles and methods to the actual facts and data of specific cases. The identities and biographical statements of *amici* appear in the addendum to this brief.

We submit this brief to clarify important economic principles that support the way in which the district court resolved disputed factual issues and assessed the likely competitive effects of the transaction. We have not made an independent investigation of the evidence, nor have we performed case-specific analysis that would allow us to reach an independent conclusion about the likely competitive effects of the merger. Rather, we focus in this brief on well-accepted economic principles.[1]

PERTINENT STATUTES

All applicable statutes are contained in the addendum to the Proof Brief of Appellant United States of America.

SUMMARY OF ARGUMENT

The district court correctly applied economic analysis to assess the effect of this vertical merger on consumers. It found no credible evidence of an

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[1] No counsel for a party authored this brief in whole or in part, and no person other than *amici* or their counsel made a monetary contribution to fund the preparation or submission of this brief. The parties have consented to the filing of this *amicus* brief.

anticompetitive effect. At the same time, the district court did find credible evidence that the merger would produce efficiencies. Consequently, the district court concluded that the government had not shown that the merger would likely diminish competition or harm consumers. Despite the arguments of the government and some *amici*, those findings should stand, as there is no indication that they were clearly erroneous.

The district court's findings do not rest on a misunderstanding of economic theory or its empirical application. To the contrary, they reflect a deep understanding of what facts are needed to apply economic theory reliably and a clear-minded appraisal of the failures of the government's evidence. The district court rejected the government's case against the merger not because of a lack of understanding of key economic principles, but because it decided that the weight of the industry testimony showed no significant anticompetitive effect but did show credible efficiencies, including those agreed to by the government, and because it decided that the government's case, including the testimony of its leading expert economic witness, Dr. Carl Shapiro, was ultimately unpersuasive.

According to the government, bargaining theory demonstrates that the merger would raise prices for rival multichannel video programming distributors (MVPDs) such as cable companies. In support of this claim, the government and Dr. Shapiro put forward a Nash bargaining model of price negotiations between Turner as content provider, on the one hand, and video pro-

gramming distributors, on the other hand. Using this model, the government argued that the merger would raise resulting prices because the fallback position for Turner—the path that it would rationally consider taking if the negotiations fell through—would be less costly after the merger. That was so, the government asserted, because the resulting blackout of Turner programming would profitably divert some of the video programming distributor's subscribers to AT&T's DirecTV.

The district court found that, although Nash bargaining can be a useful approach to evaluating mergers in *some* cases, the empirical evidence *in this case* did not support the government's claims, even when viewed through the lens of Nash bargaining. In large part, the problems the district court identified rested on the inputs to Dr. Shapiro's model, not the model itself. The court found that Dr. Shapiro employed unreliable estimates of critical inputs, including his estimate of the number of subscribers who would depart from their video content distributors and switch to DirecTV if faced with a loss of Turner content and his use of outdated and inflated profit margins for AT&T. And, critically, the district court found that small changes in the values of these inputs caused the model's predictions to change dramatically. Indeed, modest changes to the inputs caused the predicted sign for competitive harm to *flip*, so that the government's predicted prices for the programming in question would fall after the merger rather than rise. Moreover, the district court decided, on the basis of industry testimony, that

the long-term blackouts that Dr. Shapiro used as the fallback option in his Nash bargaining model are not credible threats. Given these findings, the district court was fully justified in holding that the government had failed to meet its burden to prove that the merger was likely to harm competition and consumers.

The government argues that the district court's reasoning is illogical, that it failed to understand the Nash bargaining model, that it weighed the industry testimony incorrectly, that it should have taken long blackouts into account as credible threats, and that the diversion rates driving Dr. Shapiro's model are sufficiently probative. An *amicus* brief has been filed by 27 distinguished scholars in support of these claims.

In fact, however, a review of the district court's reasoning confirms that the court did understand the Nash bargaining model, including the premise that the fallback option must be credible to be effective in influencing the negotiated outcome. It also confirms that the court found that the results of the government's model turn sensitively on the values of the inputs used to run the model and that, accordingly, the court understood that, with unreliable estimates of those inputs, the model cannot support a reliable inference of competitive harm. The court also found that the reliability of the government's model was further undercut by its inconsistency with testimony on how real-world industry bargaining works and on the actual, observed effects of past vertical integration in the industry.

Against this background, there is no basis from settled economic principles or practice to conclude that the district court's findings regarding the relevance and reliability of the government's proffered evidence were clearly erroneous. Given the facts and testimony presented in its opinion, the district court reasonably concluded that the government failed to meet its burden of proof.

ARGUMENT

A. Vertical mergers have inherent efficiencies that the district court properly considered when evaluating the merger's competitive effects.

Vertical integration is a decision by a firm about how to organize production, so that the firm might harness productive efficiencies from coordinating production within a single entity and reduce the transaction costs of trying, in the alternative, to achieve these efficiencies of vertical coordination through contract.[2] Unlike a horizontal merger, which combines firms that produce substitutes, a vertical merger combines firms that produce complements and thus generally inclines the merged firm to reduce prices, expand output, and increase investment. This is not to say that vertical mergers never raise competitive concerns. But it *is* to say that the efficiencies from vertical integration cannot be ignored if one is to predict a vertical merger's

[2] Judge Bork called vertical integration "indispensable to the realization of productive efficiencies." Robert H. Bork, *The Antitrust Paradox* 226 (1978).

likely competitive effect. *See, e.g.*, *Comcast Cable Commc'ns, LLC v. FCC*, 717 F.3d 982, 990 (D.C. Cir. 2013) (collecting cases).

In this case, it is significant that the district court held that its "ruling does *not* turn on the efficiencies offered by defendants in their affirmative case, but rather on its conclusion that the *government's* evidence, as 'undermined['] and 'discredit[ed]' by defendants' attacks, is insufficient to 'show[] a probability of substantially lessened competition,' and thus that the Government has 'failed to carry its ultimate burden of persuasion.'" *United States v. AT&T Inc.*, 310 F. Supp. 3d 161, 191 n.17 (D.D.C. 2018) (quoting *United States v. Baker Hughes Inc.*, 908 F.2d 981, 983, 990-991 (D.C. Cir. 1990)). Although this finding alone suffices to defeat the government's case, the district court further found that the merger "will achieve considerable efficiencies" that go "beyond those conceded by the Government." *Id.*

These factual findings rest on the district court's on-the-ground understanding of the entire record and justify reversal only if clearly erroneous. *See United States v. Am. Express Co.*, 838 F.3d 179, 193 (2d Cir. 2016) (following an antitrust bench trial, the district court's findings of fact reviewed "for clear error"), *aff'd sub nom. Ohio v. Am. Express Co.*, 138 S. Ct. 2274 (2018). As we describe below, the district court had a firm foundation in economic theory, in empirical research, and in the specific facts of this case for its conclusion that the government failed to carry its burden of proving a reasonable probability of substantial harm to competition.

B. The district court's analysis of competitive effects properly discounted the reliability of the government's bargaining model.

The government predicated its model of competitive effects on its interpretation of the Nash bargaining solution. In his 1950 article, *The Bargaining Problem*, John Nash proposed a solution to what he called the "bargaining situation"—an economic game in which two parties "have the opportunity to collaborate for mutual benefit in more than one way." John F. Nash, Jr., *The Bargaining Problem*, 18 Econometrica 155, 155 (1950). A solution to that game maximizes "the amount of satisfaction each [party] should expect to get from the situation." *Id.* According to Nash's model, an increase in the value of a party's position absent an agreement improves the party's bargaining position and therefore results in an improvement in that party's value of the bargain.[3]

According to the testimony of Dr. Shapiro, the theoretical definition of the no-agreement fallback for each negotiating party is the best option available to that party if no deal is reached; in other words, it is each party's best

[3] Before deriving his solution, Nash made certain assumptions about the game's participants: that each bargaining party is "highly rational," "can accurately compare [its] desires for various things," is "equal [to the other] in bargaining skill," "has full knowledge of the tastes and preferences of the other," and "wishes to maximize the utility to [itself] of the ultimate bargain." *Id.* at 155, 159. Nash further assumed the independence of irrelevant alternatives—that is, if a bargainer faces a choice between *A* and *B* and prefers *A* to *B*, then that bargainer must also prefer *A* to *B* if faced with a choice between *A*, *B*, and *C*. *Id.* at 156.

alternative to a negotiated agreement. *See* Expert Report of Carl Shapiro (redacted) at 43. The district court recognized this when it noted that "Professor Shapiro's opinion incorporates the 'key' recognition that each side's bargaining leverage 'is based on what would happen if there were no deal.'" *United States v. AT&T Inc.,* 310 F. Supp. 3d at 223 n.35.

The government uses the Nash bargaining model to predict how the merger would alter market outcomes (such as prices charged for Turner content to cable operators or other content distributors) by predicting how the merger would alter the no-agreement fallback options for Turner and its counterparty in a negotiation over content pricing. Accordingly, the conclusions drawn under the Nash bargaining model about the impact of the merger can be influenced significantly by what are viewed as the no-agreement fallback options and their predicted values to the parties. For the model to be reliable, the predicted no-agreement fallback options must be credible; the parties must actually be willing to accept them as fallbacks, or else they will not influence the market outcomes predicted by the Nash bargaining model.[4] Likewise, the underlying predictions of the merger's effects on the

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[4] This perspective was emphasized by Nash in his 1953 article, extending his 1950 article in a manner that "tells the players what threats they should use in negotiating." John Nash, *Two-Person Cooperative Games*, 21 Econometrica 128, 130 (1953). He summarized: "Supposing *A* and *B* to be rational beings, it is essential for the success of the threat that *A* be *compelled* to carry out his threat *T* if *B* fails to comply. Otherwise it will have little meaning." *Id*. Both the government and Dr. Shapiro relied heavily on

parties' valuations of their fallback options must also be reliable. If those predictions are inaccurate, then the model will not reflect the real-world incentives facing the parties during actual negotiations, and its results about the impacts of the merger on market outcomes will not be reliable.

1. *Economic models that are highly sensitive to input assumptions are only as reliable as the assumptions themselves.*

Sensitivity to changes in basic assumptions is a critical characteristic of many models, including economic models. If very slight changes in a key assumption radically change the model's predictions, one must question the validity of the model, at least when it is applied to situations in which the assumption is not strictly (rather than approximately) satisfied.

To be sure, Nash bargaining can be a useful theoretical modeling tool for gauging the economic effects of mergers. But it was entirely appropriate for the district court to question the empirical robustness of the results emerging from the government's bargaining model by testing the sensitivity of those results to modest changes in assumed input values.

Such testing is entirely routine in economic analysis. Indeed, it is expected for credible work. And it was particularly important in this case because the government predicted only very modest net harm, especially in

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the credibility of threats made during bargaining. *See* Shapiro Report (redacted) at 41 & n.169; Shapiro Rebuttal Report (redacted) at 42 & n.162. Dr. Shapiro cited Nash's 1950 article—but not Nash's 1953 article—as the basis for his bargaining model of competitive effects.

the context of a typical subscriber's monthly cable TV bill. Absent any demonstration that the estimate of harm remains positive in the face of reasonable modifications to the inputs and assumptions—that is, absent a demonstration that the result is robust and not input-sensitive—such a modest estimate cannot reliably and meaningfully support an inference of harm. Here, the government provided no such demonstration, yet it attempted to draw such an inference.

The effects of a given merger on the economic variables of interest depend on many case-specific inputs and parameters. The general framework of Nash bargaining cannot determine a merger's effects. To do that, it is necessary to examine the values of those inputs and parameters, the precision with which they can be determined, and the sensitivity of any predictions to changes in those inputs. The fact that the government's prediction of net harm was extremely sensitive to input values—which were based on assumptions that the district court found to be unsupported by or inconsistent with the evidence—appropriately calls into question the reliability and the probative value of the government's predictions.[5]

For example, the results of the government's model are highly sensitive

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[5] As the Federal Circuit explained in the context of measuring reasonable royalty damages, "[t]he Nash [bargaining] theorem arrives at a result that follows from a certain set of premises" but "itself asserts nothing" about the real-world reliability of those premises. *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1332 (Fed. Cir. 2014) (analyzing Nash, *The Bargaining Problem*, *supra*).

to predictions about customer "departures" (the number of customers that would leave a rival content distributor in the face of a long-term Turner blackout) and "diversions" (the number of those departing customers that would switch to DirecTV). This is so because the government's theory rests on the long-term blackout scenario as the no-agreement fallback for the Nash bargaining. The merger's anticipated effect on the cost to Turner of a long-term blackout depends on predicted increases in profits from new subscribers who switch to DirecTV from the competing distributor because Turner's content is blacked out on the competitor's service.

The government (and its expert economic witnesses) did not directly measure the anticipated departures and diversions empirically. Although we offer no opinion on the details of how departures and diversions were estimated, we note that insofar as the district court determined that the government's estimates were unreliable, it was correspondingly appropriate as a matter of sound economic analysis for the district court to conclude that any predicted price increases emerging from the model were also unreliable.

This concern is not about the theoretical underpinnings of Nash bargaining, but rather whether the inputs into the government's version of the Nash bargaining model themselves were reliable and hence whether the predictions of the government's model were reliable on that basis.

As another example, the parties agreed that the results of the government's bargaining model were highly sensitive to estimates of AT&T's profit

margins on its video customers. Again, the merger's anticipated effect on Turner's bargaining outcome depends on the merger's impact on the cost of a long-term blackout to the post-merger firm. That impact, in turn, depends on the profit margin to DirecTV on the flow of new subscribers that results from the blackout. We offer no opinion on the government's particular profit-margin assumption. But inasmuch as the district court determined that the margin employed in the model was outdated and inflated, it was appropriate to identify this shortcoming as yet another reason to reject the model's conclusions.

According to the district court, the evidence supported estimated values for these and other inputs that would have yielded predictions from the government's model of net benefits resulting from the merger. Inasmuch as the district court concluded that those estimates of the input values were more credible than the government's estimates, it was once again appropriate for the district court to reject as unreliable the government's claims of net harm.

The debate in this case over each of the inputs also highlights the lack of any measure of statistical confidence for the government's estimate of harm. None of the inputs that the government used was known with certainty, meaning that there was inherent uncertainty in the government's estimate of harm. Yet, the government provided no measure of the degree of that uncertainty, such as a "standard error." It is conventional in economic

practice to provide standard errors or other measures of the precision of one's estimates so that a reader can determine the strength of any inferences that can be drawn from the estimates.[6]

In this case in particular, an estimate of modest harm coupled with the failure to present any information about the estimate's degree of precision or robustness makes it impossible to draw any reliable inferences from the government's bargaining model. Indeed, because the inputs were multiplied together to reach a final price prediction in the government's model, the uncertainty surrounding the final estimate is even greater than the sum of the uncertainties associated with each of the inputs considered independently.

Given the evidence-based critiques and skepticism of the district court about key inputs into the government's model, and given evidence that the government's conclusions were sensitive to its choices of values for multiple inputs (as well as to its simplifying assumptions), it was appropriate for the district court to conclude that it could not draw meaningful inferences of competitive harm from the government's estimates of harm.

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6 That is why reporting of standard errors or other measures of precision is a requirement for publication in the leading professional economic literature and why measures of statistical accuracy and econometric inference have been core subjects of leading economics Ph.D. education programs for at least 50 years.

2. The district court's skepticism of the government's bargaining model was appropriate in light of the facts.

All economic models are necessarily simplified abstractions, and Nash himself noted in his 1953 article that the assumptions required by his simplified model "are not generally perfectly fulfilled in actual situations." Nash, *Two-Person Cooperative Games*, *supra*, at 130. It is important to evaluate whether simplifications in a model in fact abstract away from important elements in a way that affects the accuracy of the model's predictions.

Bargaining is complex, and many factors can influence bargaining outcomes. The government is wrong to suggest that the district court should have accepted that the merger would substantially affect bargaining leverage and bargaining outcomes simply because a contested empirical implementation of a particular theoretical bargaining model says so.

Models that predict well in some circumstances can produce highly inaccurate predictions in other circumstances. It was appropriate for the district court to evaluate whether the particular version of the model that the government presented rested on assumptions that were appropriate to the particular circumstances of this merger. The district court was also right as a matter of sound economic reasoning to ask whether the price increases predicted by the government's model are consistent with industry facts and experience, including actual experience following prior vertical mergers. A model shown to be inconsistent with outcomes of previous events is much less

likely to predict the outcomes of current events reliably. Insofar as the district court found that actual experience following prior vertical mergers contradicted the predictions of the government's model, it was appropriate for the district court to be skeptical about the predictions of the government's model on that basis.

Key features of the television-content-distribution industry present serious challenges for the application of a simple Nash bargaining model. Nash bargaining, as developed in the scholarly articles described above, addresses one-shot, bilateral negotiation, while actual bargaining between video content providers and distributors is repeated and multilateral. Although the economic literature has begun considering how to handle multilateral, dynamic negotiation settings, that literature is far from a settled consensus on the appropriate method in such cases or on whether certain simplifying approaches yield accurate predictions. This lack of consensus makes it all the more important for a factfinder to question the reliability of conclusions from a bargaining model that is a poor fit with the context to which it is applied.

Nash himself noted that, in his model, "we must suppose that the players have no prior commitments that might affect the game." Nash, *Two-Person Cooperative Games*, *supra*, at 130. But, as the district court recognized, negotiations in this industry occur in the shadow of several kinds of prior commitments, such as most-favored-nation clauses in other contracts,

contractual commitments to arbitration, and regulatory requirements. The district court thus properly questioned whether abstraction away from such industry conditions within the model might cause the model to produce inaccurate predictions.

In particular, the district court was right to ask whether a permanent blackout—an extremely rare event—was the most appropriate alternative to an immediate negotiated agreement, rather than a delayed agreement following a temporary blackout or some other more credible outcome. The conclusions of the Nash bargaining model presented by the government would be significantly affected by this distinction, in terms of the associated assumed flows of diverted video customers and the losses of subscriber fees and advertising revenues that underlie the bargaining parties' valuations of the fallback scenarios.

The government's model assumes that a permanent blackout would be the relevant and credible fallback outcome of a failure of the bargaining parties to reach an agreement. But there is no theoretical reason why that must be so, and there is no theoretical basis to reject an evidence-based conclusion to the contrary. Determining the relevant no-agreement fallback must be informed by the specifics of the industry and the contractual and regulatory constraints present in the negotiation. The district court was correct to consider evidence to that effect.

Nor can a proper application of Nash bargaining in this context ignore

the presence of regulation and Turner's prior commitment to binding arbitration. Both legal constraints change Turner's no-agreement fallback scenario, which, as discussed above, is a crucial element of both the government's argument and the Nash bargaining model. There may be disagreement about the precise economic effect of these legal constraints, but a reliable bargaining model cannot just ignore the effects of Turner's arbitration commitment and the FCC's program-access rules on the options open to each party, as the government's bargaining model did and the district court properly refused to do.

3. There is no inherent contradiction in the district court's treatment of the profit-maximizing decisions of multi-division firms.

The government asserts that the district court's opinion is inconsistent with the principle that corporations will seek to maximize corporate-wide profit. As the government sees it, the district court was wrong as a matter of law to conclude that, when negotiating with content distributors, vertically integrated content providers (like Turner) might focus on their own profits and not incorporate spillover effects on other divisions within the post-merger firm. This argument does not follow as a matter of economics.

In the pursuit of maximized profits, multi-division firms face a multitude of decisions about when to exercise centralized control and when to allow divisions to operate in a decentralized manner. Here, the district court relied on testimony of industry fact witnesses indicating that, in an

integrated firm, the division that *produces* content does not consider in its contract negotiations the effects of its deals on the division that *distributes* content. In light of that testimony, it was not inconsistent with economic principles for the district court to conclude that these negotiations—which are highly complex even for a single division—are an example of profit-maximizing firms choosing to operate in a more decentralized manner. Indeed, given that the district court also concluded that any benefits to the integrated content distributor may be small and difficult to ascertain, it was consistent for the court to conclude that the overall corporation may not find it worth the complication and risks from asking its content division to negotiate more aggressively on account of a hoped-for diversion of new subscribers to its distribution division.

This line of reasoning does not contradict the district court's acceptance of the cost savings resulting from the elimination of "double marginalization," an economic principle that says that, once merged, DirecTV will no longer see the margin charged to it by Turner as a true economic cost, and thus will face lower economic costs and have an incentive to cut prices accordingly. As a matter of economic reasoning, there is no inherent contradiction in saying that a multi-division firm will reach different decisions about centralization versus decentralization on different topics. An integrated firm may well find a way to induce its internal divisions to work together to capitalize on the efficiencies of vertical integration (such as the elimination of double margin-

alization) while concluding that negotiations with outside entities are better handled in a decentralized way. That is especially so when (as here) the cross-divisional effects of those negotiations are modest and uncertain.

In short, the district court committed no clear error by concluding that the facts of this case supported such decisions and that the government had failed to meet its burden of persuasion to the contrary.

CONCLUSION

For the foregoing reasons, the judgment below should be affirmed.

September 26, 2018

Respectfully submitted,

/s/ *Michael B. Kimberly*

ANDREW J. PINCUS
MARK W. RYAN
MICHAEL B. KIMBERLY
Mayer Brown LLP
1999 K Street NW
Washington, DC 20006
(202) 263-3127

Counsel for amici curiae

CERTIFICATE OF COMPLIANCE

Pursuant to Federal Rule of Appellate Procedure 32(g(1)), undersigned counsel certifies that this brief:

(i) complies with the type-volume limitation of Rules 29(a)(5) and 32(a)(7)(B) because it contains 4,437 words, excluding the parts of the brief exempted by Rule 32(f) and Circuit Rule 32(e)(1); and

(ii) complies with the typeface requirements of Rule 32(a)(5) and the type style requirements of Rule 32(a)(6) because it has been prepared using Microsoft Office Word 2007 and is set in Century Schoolbook font in a size equivalent to 14 points or larger.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

CERTIFICATE OF SERVICE

I hereby certify that that all participants in this appeal are registered CM/ECF users and that service will be accomplished via the Court's CM/ECF system this day, September 26, 2018.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

ADDENDUM

IDENTITIES AND BIOGRAPHIES OF THE *AMICI CURIAE*

1. Thomas C. Arthur is the L. Q. C. Lamar Professor of Law at the Emory University School of Law, where he has been on the faculty since 1982. Previously, he practiced law for eleven years in the Washington, D.C. office of Kirkland & Ellis. Arthur teaches antitrust, civil procedure, and administrative law. His research has been published in the *Antitrust Law Journal*, *California Law Review*, *Emory Law Journal*, *Journal of Corporation Law, New York University Law Review*, *Tulane Law Review*, and elsewhere. Arthur holds a B.A. from Duke University and a J.D. from Yale Law School.

2. Elizabeth E. Bailey is Professor Emeritus of Business Economics and Public Policy at the Wharton School at the University of Pennsylvania. Her research focuses on industrial organization (particularly the theory of contestability), economic deregulation, and strategic management of economic regulation. She has written three books, including *Economic Theory of Regulatory Constraint* (D.C. Heath 1973). Her research has appeared in such journals as the *American Economic Review*, *Bell Journal of Economics, Brookings Papers on Economic Activity*, *Economic Journal*, *Journal of Economic Literature*, *Journal of Law and Economics*, *Journal of Political Economy*, *Journal of Public Economics*, and the *Yale Journal on Regulation*. From 1983 to 1991, she was Dean of the Graduate School of Industrial Administration at Carnegie Mellon University. Bailey previously was a

Commissioner on the Civil Aeronautics Board. From 1960 to 1977, she was at Bell Laboratories, where she began as a computer programmer and rose to head of the Economics Research Department. She has served as a director of CSX Corporation, Philip Morris, and TIAA-CREF, and she has been a trustee of the Brookings Institution since 1988. Bailey is a member of the National Bureau of Economic Research and was elected a Fellow of the American Academy of Arts and Sciences in 1997. She received a B.A. from Radcliffe College, an M.S. from the Stevens Institute of Technology, and a Ph.D. from Princeton University, where she was the first woman to receive a doctorate in economics.

3. **Jonathan Barnett** is Professor of Law at the University of Southern California, Gould School of Law, where he directs the Media, Entertainment and Technology Law Program. He specializes in intellectual property, antitrust, and corporate law. Barnett has published articles in the *Harvard Law Review*, *Yale Law Journal*, *Journal of Legal Studies*, *Review of Law & Economics*, and other scholarly journals. He previously practiced at Cleary Gottlieb in New York. A graduate of the University of Pennsylvania, Barnett received a MPhil from Cambridge University and a J.D. from Yale Law School.

4. **Donald J. Boudreaux** is Professor of Economics at George Mason University, where he has been a faculty member since 2001. He was formerly Associate Professor of Economics at Clemson University and Assistant

Professor of Economics at George Mason University. From 1997 to 2001, Boudreaux was president of the Foundation for Economic Education. His research concerns antitrust economics and the economics of international trade, and his articles have been published in *The Journal of Commerce*, the *Cato Journal*, and the *Supreme Court Economic Review*, among other publications. Boudreaux has lectured around the world on subjects including competition law and economics. He received his B.A. from Nicholls State University, his M.A. from New York University, his J.D. from the University of Virginia, and his Ph.D. in economics from Auburn University.

5. Henry N. Butler is Dean, George Mason University Foundation Professor of Law, and Executive Director of the Law & Economics Center at the Antonin Scalia Law School, George Mason University. For over 25 years, Butler has led judicial education programs that teach the basics of economics, finance, accounting, statistics, and scientific methods to over 3,000 sitting federal and state judges. From 2007 to 2010, he served as the first executive director of the Searle Center on Law, Regulation, and Economic Growth at Northwestern University School of Law. Butler has held prior appointments at The Brookings Institution, Chapman University, the University of Kansas, the University of Chicago, and Texas A&M University. He received an M.A. and a Ph.D. in economics from Virginia Polytechnic Institute and State University and a J.D. from the University of Miami School of Law. He holds a bachelor's degree in economics from the University of Richmond.

6. Jeffrey R. Church is a Professor in Economics at the University of Calgary, where he has been on the faculty since 1989. From 1995 to 1996, he was the T. D. MacDonald Chair in Industrial Economics at the Canadian Competition Bureau. His published research includes articles on merger simulation, network economics, strategic competition, entry deterrence, intellectual property rights, and competition policy. His research has been published in the *Canadian Journal of Economics, International Journal of Industrial Organization*, *Journal of Competition Law & Economics*, *Journal of Econometrics*, *Journal of Economics and Management Strategy*, and elsewhere. Church is the coauthor of *Industrial Organization: A Strategic Approach* (McGraw-Hill 2000), as well as a monograph for the European Commission on the competitive impacts of vertical and conglomerate mergers and a book on the regulation of natural gas pipelines in Canada. He has served as an expert on regulatory and competition policy matters. Church has a Ph.D. in economics from the University of California, Berkeley, and a B.A. in economics from the University of Calgary.

7. Kenneth G. Elzinga is the Robert C. Taylor Professor in Economics at the University of Virginia, where he has been a faculty member since 1967. His major research interest is antitrust economics, especially pricing strategy and market definition. Elzinga has testified in several precedent-setting antitrust cases and was the economic expert for the prevailing parties in three Supreme Court cases: *Matsushita*, *Brooke Group*, and *Leegin*. He has

authored more than 100 academic publications. He was Special Economic Advisor to the Assistant Attorney General, Antitrust Division, from 1970 to 1971. A former Fellow in Law and Economics at the University of Chicago and a Thomas Jefferson Visiting Scholar at Cambridge University, Elzinga also is a past president of the Southern Economic Association. He has a B.A. from Kalamazoo College and a Ph.D. from Michigan State University.

8. Richard A. Epstein is the Laurence A. Tisch Professor of Law at the New York University School of Law, the Peter and Kristen Bedford Senior Fellow at the Hoover Institution, and the James Parker Hall Distinguished Service Professor of Law, Emeritus, and senior lecturer at the University of Chicago. He previously taught at the University of Southern California. Epstein has taught in a wide range of areas, including regulated industries, antitrust law, and administrative law, and has written extensively on these topics and others, including his book *Antitrust Consent Decrees in Theory and Practice: Why Less Is More*. He was editor of the *Journal of Legal Studies* (1981-1991) and the *Journal of Law and Economics* (1991-2001). He has been a senior fellow at the MacLean Center for Clinical Medical Ethics since 1984 and was elected a fellow of the American Academy of Arts and Sciences in 1985. Epstein received a B.A. in philosophy from Columbia University, a B.A. in law from Oxford University, and an LL.B. from Yale Law School.

9. Gerald R. Faulhaber is Professor Emeritus of Business and Public Policy, and of Management, at the Wharton School of the University of

Pennsylvania. He also holds a faculty appointment at the law school of the University of Pennsylvania. Previously, Faulhaber was Director of Strategic Planning and Financial Management at AT&T, after holding the position of Head of Economics Research at Bell Laboratories. He served as Chief Economist at the Federal Communications Commission from 2000 to 2001, where he worked on many telecommunications and Internet issues, including the AOL-Time Warner merger. Faulhaber is the author of several books, including *European Economic Integration: Technological Perspectives* and *Telecommunications in Turmoil: Technology and Public Policy*. He has served on numerous scholarly boards and review committees and was Vice-President of the Board of Directors of the Telecommunications Policy Research Conference in Washington, D.C. Faulhaber received his M.A. and Ph.D. in economics from Princeton University.

10. Harold Furchtgott-Roth is a Senior Fellow at the Hudson Institute and founder of the Center on the Economics of the Internet. He is an adjunct professor of law at Brooklyn Law School. He also is president of Furchtgott-Roth Economic Enterprises. From 1997 through 2001, Furchtgott-Roth served as a commissioner of the Federal Communications Commission. Before his appointment to the FCC, he was chief economist for the House Committee on Commerce and a principal staff member involved in the enactment of the Telecommunications Act of 1996. Furchtgott-Roth has served on corporate and advisory boards, is the author of scores of

publications, and has authored or co-authored four books. Furchtgott-Roth received a Ph.D. in economics from Stanford University and an S.B. in economics from the Massachusetts Institute of Technology.

11. Alexander Galetovic is Professor of Economics at the Universidad de los Andes in Santiago, Chile, and a visiting fellow at the Hoover Institution at Stanford University. Galetovic has written extensively on competition and regulation and published widely in leading academic journals, among them the *Journal of Political Economy*, *American Economic Review*, *Review of Economics and Statistics*, *Journal of the European Economic Association*, *Journal of Industrial Economics*, *Journal of Competition Law & Economics*, and *Harvard Business Review*. His current research addresses the interplay of intellectual property and antitrust in high technology industries. Galetovic holds a B.A. in economics from the Pontifical Catholic University of Chile and a Ph.D. in economics from Princeton University.

12. Charles J. Goetz is the Joseph M. Hartfield Professor of Law Emeritus at the University of Virginia School of Law, where, in 1975, he became the first full-time non-lawyer member of the faculty. He teaches antitrust law, contracts, law and economics, and modern methods of proof (complex evidence: experts, statistics, video, computers, and more). His research concerns the applications of economic analysis to law and antitrust, regulatory, and non-market public policy analysis. His books include

Antitrust Law: Interpretation and Implementation (with the late Fred S. McChesney) (Foundation Press 3d ed. 2006), *Using Experts: Pretrial Preparation, Trial Testimony and Settling Cases* (with Stephen A. Saltzburg and Gregory P. Joseph) (1985), and *Cases and Materials on Law and Economics* (West Publishing 1984). His articles have appeared in the *California Law Review*, *Columbia Law Review*, *Cornell Law Review*, *International Review of Law and Economics*, *Stanford Law Review*, *Virginia Law Review*, *Yale Law Journal*, and elsewhere. Goetz has taught economics courses for the judiciary, in the Law School's LL.M. program for judges, and in programs for the federal judiciary under the auspices of the Federal Judicial Center and the George Mason Law and Economics Center. He received an A.B. from Providence College in 1961 and a Ph.D. in economics from the University of Virginia in 1965.

13. Barry C. Harris is the Chairman of Economists Incorporated. He previously served as the Deputy Assistant Attorney General for Economics at the Antitrust Division. Harris was also Chief of the Rail Cost & Pricing Policy Branch at the International Chamber of Commerce and was a senior staff economist at the Antitrust Division. He is the author of many articles addressing competitive effects and other antitrust issues, and he has testified in many antitrust and regulatory proceedings concerning the competitive effects of mergers. Harris co-developed the concept of Critical Loss, which is used to identify antitrust markets, competitive effects, and the incentives of

merger participants and has been incorporated into the *Horizontal Merger Guidelines*. He holds a B.A. in mathematics from Lehigh University and a Ph.D. in economics from the University of Pennsylvania.

14. Jerry A. Hausman is the MacDonald Professor of Economics Emeritus at the Massachusetts Institute of Technology, where he has been a faculty member for 43 years. Hausman received the John Bates Clark Award from the American Economic Association in 1985 for the most outstanding contributions to economics by an economist under 40 years of age. He also received the Frisch Medal from the Econometric Society and the Biennial Medal of the Modeling and Simulation Society of Australia and New Zealand. In 2013, Hausman was named a Distinguished Fellow of the American Economic Association. His research concentrates on econometrics and applied microeconomics. His applied research has concerned demand for differentiated products, telecommunications, regulation, the effects of taxation on the economy, and industrial organization. Hausman is a co-inventor of merger-simulation models, which form the basis of the government's merger estimates in this case. He holds a DPhil from Oxford University, where he was a Marshall Scholar, and a B.A. from Brown University.

15. Thomas W. Hazlett is the Hugh H. Macaulay Endowed Professor of Economics at Clemson University, where he also serves as Director of the Information Economy Project. He has previously held faculty or research

positions at the University of California, Davis, Columbia University, the Wharton School, and George Mason University, and he was Chief Economist of the Federal Communications Commission. Hazlett is widely known for his research in telecommunications markets and government regulation, and his articles have appeared in such publications as the *Journal of Law & Economics*, *Journal of Financial Economics*, *RAND Journal of Economics*, *Journal of Competition Law & Economics*, *Economic Inquiry*, *Columbia Law Review*, *University of Pennsylvania Law Review*, and *Journal of Economic Perspectives*. He received his Ph.D. in economics from the University of California, Los Angeles. Hazlett's most recent book is *The Political Spectrum: The Tumultuous Liberations of Wireless Technology, From Herbert Hoover to the Smartphone* (Yale University Press 2017).

16. Justin "Gus" Hurwitz is an Associate Professor of Law and Co-Director of the Space, Cyber, and Telecommunications Law Program at the Nebraska College of Law. His work has appeared in the *Harvard Journal of Law and Technology*, *Michigan Telecommunications and Technology Law Review*, the *University of Pennsylvania Law Review*, and other law review and journals. Hurwitz previously was the inaugural Research Fellow at the University of Pennsylvania Law School's Center for Technology, Innovation and Competition (CTIC) and a Visiting Assistant Professor at George Mason University Law School. From 2007 to 2010, he was a trial attorney with the Antitrust Division in its Telecommunications and Media Enforcement

Section. Hurwitz has a J.D. from the University of Chicago Law School, an M.A. in economics from George Mason University, and a B.A. from St. John's College.

17. Keith Hylton is the William Fairfield Warren Professor of Boston University and Professor of Law at Boston University School of Law. He is the author of *Antitrust Law: Economic Theory and Common Law Evolution* (Cambridge University Press 2003), a contributing editor of *Antitrust Law Journal*, co-editor of *Competition Policy International*, and a former chair of the Section on Antitrust and Economic Regulation of the American Association of Law Schools. Hylton has written on antitrust, tort law, labor law, intellectual property, civil procedure, and empirical legal analysis. He has published five books and more than 100 articles in legal and economic journals. Hylton has a B.A. from Harvard College, a J.D. from Harvard Law School, and a Ph.D. in economics from the Massachusetts Institute of Technology.

18. Joseph P. Kalt is the Ford Foundation Professor Emeritus of International Political Economy at the Kennedy School of Government at Harvard University. He also heads the Harvard Project on American Indian Economic Development. Kalt's research focuses on exploring the economic implications and political origins of the government regulation of markets. Kalt received his B.A. in economics from Stanford University and his M.A. and Ph.D. in economics from the University of California, Los Angeles.

19. Benjamin Klein is Professor Emeritus of Economics at the University of California, Los Angeles. He has consulted extensively on antitrust issues and has made many presentations to state, federal, and foreign regulatory agencies and courts. Klein has served as a consultant to the Federal Trade Commission and the Antitrust Division and has testified before Congress. He has published widely on antitrust, contract, and intellectual property issues, making landmark economic contributions in the areas of vertical restraints and the economics of the firm that have been cited in 25 U.S. federal court (including Supreme Court) decisions. He has taught at the Economics Institute for Federal Judges and currently serves on the board of editors of five academic journals, including as a contributing editor to the *Antitrust Law Journal*. He received his B.A. from Brooklyn College, City University of New York, and his M.A. and Ph.D. in economics from the University of Chicago.

20. Jonathan Klick is Professor of Law at the University of Pennsylvania Law School. His research focuses on using econometric methods to identify the causal effects of laws and regulations on individual behavior. Klick is the author of two books, including *The Empirical Revolution in Law and Economics*, and of articles in economics journals, including the American Law & Economic Review, *Journal of Economic Perspectives*, *Journal of Law & Economics*, *Journal of Law, Economics, and Organization*, and *Journal of Legal Studies*, and leading law reviews, including the *Columbia Law Review*,

Stanford Law Review, *Texas Law Review*, *University of Chicago Law Review*, and *University of Pennsylvania Law Review*. He received a B.S. from Villanova University, an M.S. from the University of Maryland, and a J.D. and Ph.D. in economics from George Mason University.

21. Thomas A. Lambert is the Wall Chair in Corporate Law and Governance and Professor of Law at the University of Missouri, School of Law. His scholarship focuses on antitrust, corporate and regulatory matters. Lambert is co-author of *Antitrust Law: Interpretation and Implementation* (5th ed., Foundation Press, 2013) and has authored or co-authored more than 20 journal articles in such publications as the *Antitrust Bulletin*, *Boston College Law Review*, *Minnesota Law Review*, *Texas Law Review*, and *Yale Journal on Regulation*. He previously practiced law with Sidley Austin and was a John M. Olin Fellow at Northwestern University School of Law and the Center for the Study of American Business (now the Murray Weidenbaum Center) at Washington University. He holds a B.A. from Wheaton College and a J.D. from the University of Chicago Law School.

22. William M. Landes is a senior lecturer and Clifton R. Musser Professor Emeritus of Law and Economics at the University of Chicago Law School. He has written widely on the application of economics and quantitative methods to law and legal institutions including antitrust, torts, civil and criminal procedure, intellectual property, judicial behavior, legal decision-making, and art law. He previously served as an editor of the

Journal of Law & Economics from 1975 to 1991 and the *Journal of Legal Studies* from 1991 to 2000. Landes is the co-author, with Judge Richard Posner, of the influential 1981 article "Market Power in Antitrust Cases," published in the *Harvard Law Review*. He co-founded Lexecon (now Compass Lexecon) and has testified before numerous federal courts and regulatory commissions. Landes has served as President of the American Law and Economics Associations and is a Fellow of the American Academy of Arts and Sciences. He received his B.A. and Ph.D. in economics from Columbia University.

23. Stan Liebowitz is the Ashbel Smith Professor of Managerial Economics at the Naveen Jindal School of Management, University of Texas at Dallas, and Director of the Center for Economic Analysis of Property Rights and Innovation. He is the author of *Rethinking the Network Economy: The Real Forces That Drive the Digital Marketplace* and *Winners, Losers, and Microsoft: Competition and Antitrust in High Technology*. Liebowitz has published articles in journals such as the *American Economic Review*, *Harvard Journal of Law & Technology*, *Journal of Political Economy*, *Journal of Law and Economics*, and the *Journal of Competition Law & Economics*. He received a B.A. from Johns Hopkins University and a Ph.D. in economics from the University of California, Los Angeles.

24. Abbott B. "Tad" Lipsky, Jr. is an adjunct professor at the Antonin Scalia Law School, George Mason University. From 1981 to 1983,

Lipsky served as Deputy Assistant Attorney General in the Antitrust Division. Lipsky was the chief antitrust lawyer for the Coca-Cola Company from 1992 to 2002. More recently he served as co-chair of the Transition Team for the Federal Trade Commission following the election of President Donald Trump. Following his retirement in February 2017 after 15 years of partnership at Latham & Watkins LLP, Lipsky served as the Acting Director of the FTC's Bureau of Competition until July 2017. He has written, spoken, and testified extensively on antitrust law, economics, policy, and legislation. He received a B.A. from Amherst College, an M.A. in economics from Stanford University, and a J.D. from Stanford Law School.

25. **John E. Lopatka** is the A. Robert Noll Distinguished Professor of Law at Penn State Law. He has published over 40 articles on antitrust, economic analysis of law, and regulated industries. He co-authored the multi-volume treatise *Federal Antitrust Law* and *The Microsoft Case: Antitrust, High Technology, and Consumer Welfare* (University of Chicago Press 2007). Lopatka is a member of the American Bar Association's Antitrust Section leadership and is a contributing editor of the section's *Antitrust Law Journal*. From 2001 until 2004, he was a consultant to the Office of General Counsel of the Federal Trade Commission. He received a B.A. from Loyola University of Chicago, a J.D. from the University of Chicago, and an LL.M. from Columbia University, where he also served as an Associate in Law and Fellow in the Center for Law and Economic Studies.

26. John W. Mayo is the Elsa Carlson McDonough Chair of Business Administration and a Professor of Economics, Business and Public Policy at Georgetown University's McDonough School of Business. His research concerns industrial organization, regulation, antitrust, and, more generally, the application of microeconomics to public policy. Mayo has published over 100 articles, book chapters, and monographs in economics, law, and public policy journals, as well as a comprehensive text on *Government and Business: The Economics of Antitrust and Regulation.* He has held senior administrative positions at Georgetown, including a term as the Dean of the McDonough School of Business. Mayo previously was a Visiting Scholar at Stanford University and the University of California, Berkeley, and has served as an advisor and consultant to both public and private agencies. Mayo has participated in a number of regulatory and antitrust proceedings and has testified before both Congress and state legislative and regulatory bodies on a number of matters, including monopolization, price fixing, mergers, and regulatory policy. He received his B.A. from Hendrix College and his Ph.D. in economics from Washington University in St. Louis.

27. Janusz A. Ordover is Professor of Economics Emeritus and a former Director of the Masters in Economics Program at New York University. He has served as the Deputy Assistant Attorney General for Economics in the Antitrust Division under President George H. W. Bush. Ordover has been an adviser to the Organization for Economic Cooperation

and Development (OECD) in Paris, the World Bank, and the Inter-American Bank for Development on matters of privatization, regulation, international trade policy, and competition policy. He has advised the governments of Poland, the Czech Republic, Russia, Hungary, Argentina, and others on regulation and competition matters, as well as on privatization strategies. He has published many articles in economics and law journals on various antitrust issues, including predation, access to bottleneck facilities, vertical integration, and the overlap between intellectual property rights and competition policy. He received a B.A. from Warsaw University and a Ph.D. in economics from Columbia University.

28. **Jorge Padilla** is Senior Managing Director of Compass Lexecon and Head of Compass Lexecon Europe and teaches competition economics at the Barcelona School of Economics and the Toulouse School of Economics. He is also a Research Fellow at the Centro de Estudios Monetarios y Financieros (CEMFI, Madrid). His expertise includes the assessment of the competitive effects of vertical mergers, including in particular mergers involving content providers and MVPD firms. He has published articles on antitrust, banking, corporate finance, and industrial organization in journals such as the *Antitrust Law Journal*, *International Journal of Industrial Organization*, *Journal of Economic Theory*, *Journal of Economics and Management Strategy*, *Journal of Competition Law & Economics*, *Journal of Law and Economics*, *RAND Journal of Economics*, *Review of Financial Studies*, and

the *University of Chicago Law Review*. He has a B.A. in economics from the University of Alicante, as well as an MPhil and DPhil in economics from the University of Oxford, Nuffield College.

29. J. Gregory Sidak is the chairman of Criterion Economics, which he founded in 1999. He has testified as an expert economic witness in complex business disputes throughout the world, and he twice served as Judge Richard Posner's court-appointed neutral economic expert. Sidak co-founded the *Journal of Competition Law & Economics*, published by the Oxford University Press. He has held the Ronald Coase Professorship of Law and Economics at Tilburg University in the Netherlands and the F.K. Weyerhaeuser Chair in Law and Economics at the American Enterprise Institute for Public Policy Research. He has been a senior lecturer at the Yale School of Management and a visiting professor at Georgetown University Law Center. Sidak was Judge Posner's first law clerk, served on the senior staff of the Council of Economic Advisers in the Executive Office of the President, and was deputy general counsel of the Federal Communications Commission. He has published six books and approximately 150 scholarly articles, primarily on antitrust, telecommunications regulation, and intellectual property. The Supreme Court of the United States, the U.S. Court of Appeals for the D.C. Circuit, and many other courts and regulatory bodies have cited his writings approvingly. He received A.B. and A.M. degrees in economics and a J.D. from Stanford University.

30. **Pablo T. Spiller** is the Jeffrey A. Jacobs Distinguished Pro-fessor of Business & Technology, Emeritus, at the Haas School of Business at the University of California, Berkeley, and a Research Associate of the National Bureau of Economic Research. His research focuses on industrial organization, political economy, economics of regulation and antitrust, and regulatory issues in developing countries. Spiller is the author of nine books and many articles that have appeared in such journals as the *International Review of Law & Economics, Journal of Economic Behavior and Organization*, *Journal of Economics and Management Strategy*, *Journal of Economic Perspectives*, *Journal of Economic Theory*, *Journal of Industrial Economics, Journal of Law & Economics*, *Journal of Law, Economics and Organization, Journal of Legal Studies, Journal of Political Economy*, *Journal of Regulatory Economics, Quarterly Journal of Economics,* and *RAND Journal of Economics.* Spiller is editor-in-chief of *Journal of Law, Economics and Organization*. In 2002, he served as Special Assistant to the Director of the Bureau of Economics in the Federal Trade Commission. He received a B.A. and an M.A. in economics from the Hebrew University of Jerusalem and an M.A. and a Ph.D. in economics from the University of Chicago.

31. **Matthew L. Spitzer** is the Director of the Searle Center on Law, Regulation, and Economic Growth and the Howard and Elizabeth Chapman Professor of Law at Northwestern University. He previously was on both the faculties of Law and Business at the University of Texas, where he served as

Director of the Massey Prize in Law, Innovation, and Capital Markets and also as the Director of the Center for Law, Business, and Economics. Before that, Spitzer was Professor of Social Science at the California Institute of Technology and Professor of Law at the University of Southern California. From 2000 to 2006, he served as the Dean of the Gould School of Law at the University of Southern California. Spitzer's publications are in administrative law, telecommunications regulation, judicial politics, and law and economics. He received a B.A. from the University of California, Los Angeles, a J.D. from the University of Southern California, and a Ph.D. from the California Institute of Technology.

32. **Alan O. Sykes** is Professor of Law at Stanford Law School and a Senior Fellow at the Stanford Institute for Economic Policy Research. His writing and teaching have encompassed international trade, torts, contracts, insurance, antitrust, international investment law, and economic analysis of law. He has served as a court-appointed neutral economic expert in antitrust litigation. In 2010, he founded Stanford Law School's LLM program in International Economic Law, Business, and Policy (IELBP). Sykes is on the Board of Editors for the *Journal of International Economic Law*, the *World Trade Review*, and a member of the editorial board of the *American Journal of International Law*. He has served as an editor of the *Journal of Legal Studies* and the *Journal of Law and Economics*. Sykes previously was the Robert A. Kindler Professor of Law at New York University Law School and

the Frank and Bernice J. Greenberg Professor of Law at the University of Chicago Law School. He holds a B.A. from the College of William & Mary and a J.D. and Ph.D. in economics from Yale University.

33. **David J. Teece** is the Tusher Professor of Global Business at the Haas School of Business, University of California, Berkeley, and Director of the Institute for Business Innovation. He is also Chairman of Berkeley Research Group, a global expert services and consulting firm. Teece has authored over 30 books and 200 scholarly papers and is co-editor of the *Palgrave Encyclopedia of Strategic Management* and *Industrial & Corporate Change*. He received his B.A. and Master of Commerce (with first-class honors) from the University of Canterbury and his Ph.D. in economics from the Wharton School of the University of Pennsylvania.

34. **John T. Tschirhart** is Emeritus Professor of Economics at the University of Wyoming, where he has been on the faculty since 1985. From 1988 to 2004, he also served as the Director of the Public Utility Research and Training Institute (PURTI) at the University of Wyoming. Tschirhart is the co-author of *Natural Monopoly Regulation: Principles and Practice* (Cambridge University Press 1988), which has been used at numerous universities and regulatory agencies. His research has been published in the *Accounting Review, American Economic Review, Bell Journal of Economics*, *Economica*, *Journal of Economic Literature*, *Journal of Economic Perspectives*, *Journal of Law and Economics*, *Journal of Political Economy*, *Journal*

of Public Economics, *Journal of Regulatory Economics*, *RAND Journal of Economics*, *Review of Economics and Statistics*, *Review of Industrial Organization*, and elsewhere. Tschirhart has a B.S. from Johns Hopkins University and an M.S. and a Ph.D. in economics from Purdue University.

35. **Robert D. Willig** is Professor Emeritus of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University. Before his 40 years teaching at Princeton, he was a Supervisor in the Economics Research Department of Bell Laboratories. His teaching and research have specialized in industrial organization, the relationship between government and business, and welfare theory. Willig served as Deputy Assistant Attorney General for Economics in the Antitrust Division from 1989 to 1991. He is the author of *Welfare Analysis of Policies Affecting Prices and Products* (Garland Press 1980), *Contestable Markets and the Theory of Industry Structure* (with William J. Baumol and John C. Panzar) (Harcourt Brace Jovanovich 2d ed. 1989), and many articles in the *American Economic Review*, *Bell Journal of Economics*, *Econometrica*, *Harvard Law Review*, *Journal of Finance*, *Journal of Law & Economics*, *Journal of Political Economy*, *Quarterly Journal of Economics*, *Yale Law Journal*, and other journals. Willig is co-editor of *The Handbook of Industrial Organization* (North Holland Press 1989), and he has served on the editorial boards of the *American Economic Review*, the *Journal of Industrial Economics*, and the MIT Press Series on Regulation. He is an elected Fellow

of the Econometric Society. He received a Ph.D. in economics from Stanford University in 1973, an M.S. in operations research from Stanford in 1968, and an A.B. in mathematics from Harvard University in 1967.

36. **Christopher S. Yoo** is the John H. Chestnut Professor of Law, Communication, and Computer & Information Science at the University of Pennsylvania, where he also serves as the Founding Director of the Center for Technology, Innovation and Competition. He has published five books and more than 90 articles in leading legal and economic journals, including the *Harvard Law Review*, *Columbia Law Review*, *University of Chicago Law Review*, *New York University Law Review*, *University of Pennsylvania Law Review*, and *Review of Industrial Organization*. Yoo received an A.B. from Harvard College, an MBA from the Anderson School at the University of California, Los Angeles, and a J.D. from Northwestern University Pritzker School of Law. He previously taught at the Vanderbilt Law School and clerked for A. Raymond Randolph of the U.S. Court of Appeals for the D.C. Circuit and Anthony M. Kennedy of the Supreme Court of the United States.

37. **John M. Yun** is Associate Professor of Law at the Antonin Scalia Law School, George Mason University, and the Director of Economic Education at the Global Antitrust Institute (GAI). He previously was the Acting Deputy Assistant Director in the Bureau of Economics at the Federal Trade Commission. His experience includes the analysis of horizontal mergers, vertical restraints, and exclusionary conduct. His research concerns

law and economics, antitrust, regulatory policy, and industrial organization. Yun has published articles in academic journals, including the *International Journal of Industrial Organization*, *Economic Inquiry*, *International Review of Law and Economics*, and *Review of Industrial Organization*. He has taught economics at Georgetown University, Emory University, and Georgia Tech. He received his B.A. in economics from the University of California, Los Angeles, and his Ph.D. in economics from Emory University.